Second Industry Workshop on “Energy Efficiency Technologies For Government Buildings – New and Retrofits”

ThermoNet ECONET System

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Group VP Technology
Fläkt Woods Group

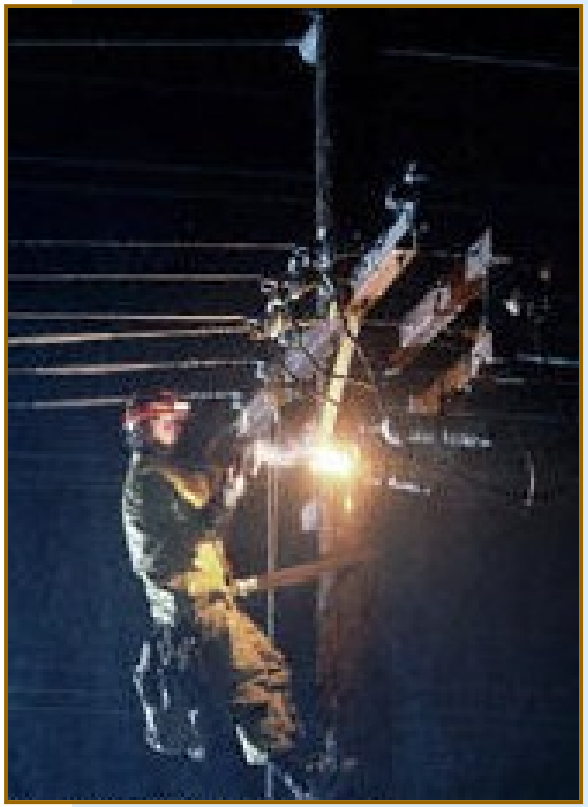
Agenda

- FläktWoods Group in short
- ThermoNet Innovation
- Impacts on the BES le
- Business Evidence

Importance of Energy

Business processes are reengineered.
Enterprise resources are planned.
Total quality is managed.
The supply chain is automated.
The corporation is right-sized.
Taxes are minimized.
HR is online.

Energy costs… are merely tolerated even if they can be the third or fourth largest enterprise cost!



Fläkt Woods Group

We are committed to be the leading provider of ventilation products and services for Buildings and Industry

Buildings

- Clean and fresh air for people to live
- Comfort at work or in public areas

Industry

- Efficiency and reliability of equipment and processes ventilated or cooled by our products

Air Climate

• No 1 in Europe for Air Handling Units

• No 2 in Europe for Air Diffusion products

Air Movement

• No 1 worldwide for metro fan

• No 1 in traction fans leading for axial and industrial fans

Fläkt Woods Group

Local presence for products and services

- 100 sales offices and 80 representatives in 95 countries
- Own engineering and manufacturing operations in 18 countries:

- **Sweden**
- **Finland**
- **United Kingdom**
- **Ireland**
- **France**
- **Italy**
- **Belgium**
- **Spain**
- **Poland**
- **Russia**
- **Dubai**
- **India**
- **Korea**
- **Japan**
- **Australia**
- **South Africa**
- **USA**
- **Canada**

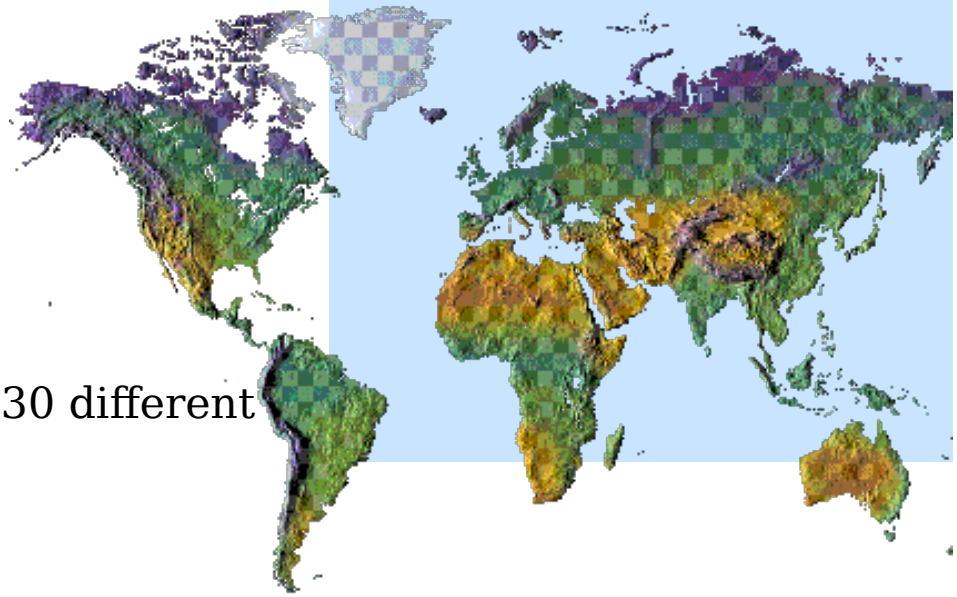
- Our 3200 employees represent 30 different nationalities
- Turn over 500 M€

Fläkt Woods was formed in 2002 out of a merger of two companies:

• **Fläkt** - a specialist in air handling, fans and air climate.

• **Woods** - a global leader in axial fans.

Fläkt Woods is a privately held company owned by Compass Partners and the management



R&D Centres (Air Climate)

- **Jönköping Sweden**
  air treatment and decentralized comfort
- **Toijala Finland**
  air diffusion and fire safety
- **Colchester UK**
  fans for buildings
- Pan European network for controls and communication

- **Competencies:**
  - Aerodynamics
  - Acoustics
  - Air Treatment
  - Air Filtration
  - Fluid dynamics and heat transfer
  - Controls and commu
  - Energy Efficiency
  - Hygiene in Air treat

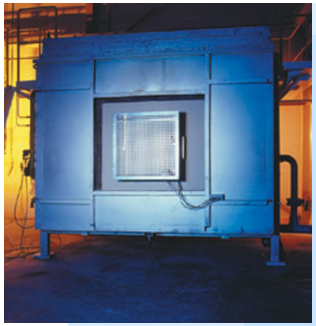
We have 65 and 165 engineers working on R&D and customer projects, respectively

Test facilities

Sound test laboratories

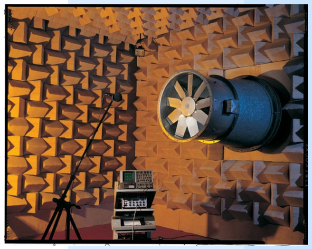
Numerous, on appr. 10 sites;

- Toijala FI
- Jönköping SE
- Colchester UK…



Fire test laboratories

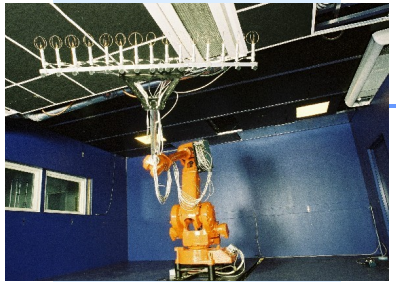
- Toijala FI
- Colchester UK



Fan test laboratories

Numerous;

- Växjö SE
- Jönköping SE
- Colchester UK…



Comfort laboratory

- Jönköping SE

Air treatment laboratory

- Jönköping SE

FläktWoods's Global Solution

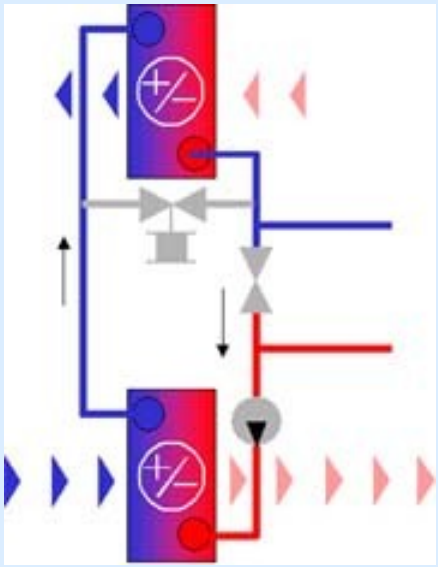
For the **Global applications**,we have an *unmatched application expertise and knowledge in:*

- Hygienic environment
- Cars parks and warehouses
- Fire safety in buildings
- **Energy efficiency in buildings and industry**
- Marine and offshore
- Tunnels and metros
- Industrial processes and wate
- Cement and steel
- Pulp drying
- Motors and generators cooling

Whatever man-made construction in the world you might enter, someone cared for the ventilation there. And it's a good chance it was we who did.

Low Energy System ThermoNet-

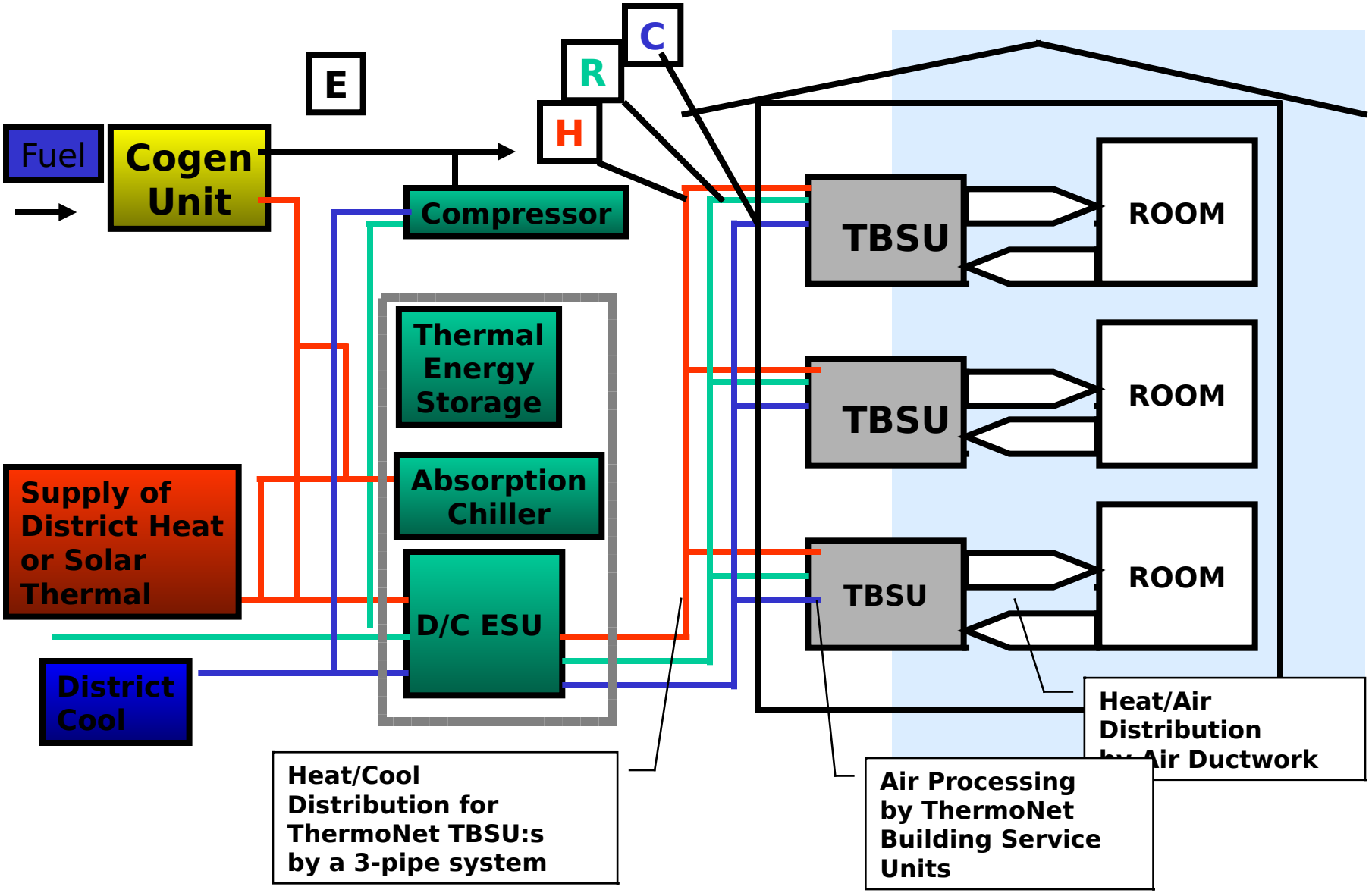
- A system solution to rationalise energy use in buildings
- Utileses low grade thermal energies
- Based on system design and multifunctional heat transfer module in AHU
- Value proposition:
  - Up to 60 % savings in heating energy
  - Up to 30 % savings in electricity consumption
  - Up to 90% utilisation of waste energies



LowEx

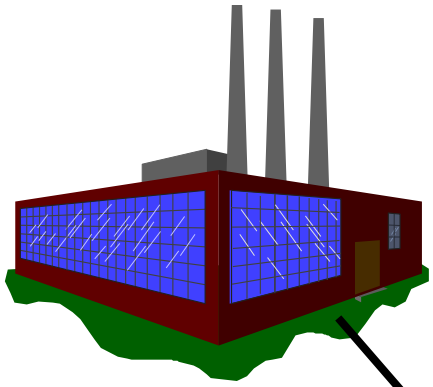
A Flagship of FläktWoods Global Solutions

Total Energy Service Concept



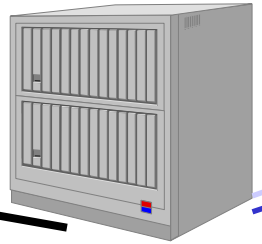
A District Cooling Concept

Cogeneration power plant produces electricity and heat

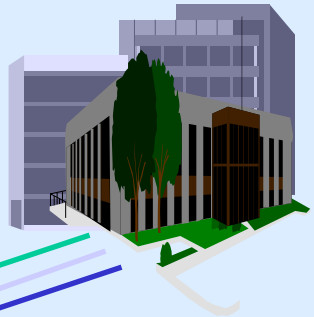


District heating net to the urban areas

ThermoNet® Energy Center produces cooling and heat for local distribution net



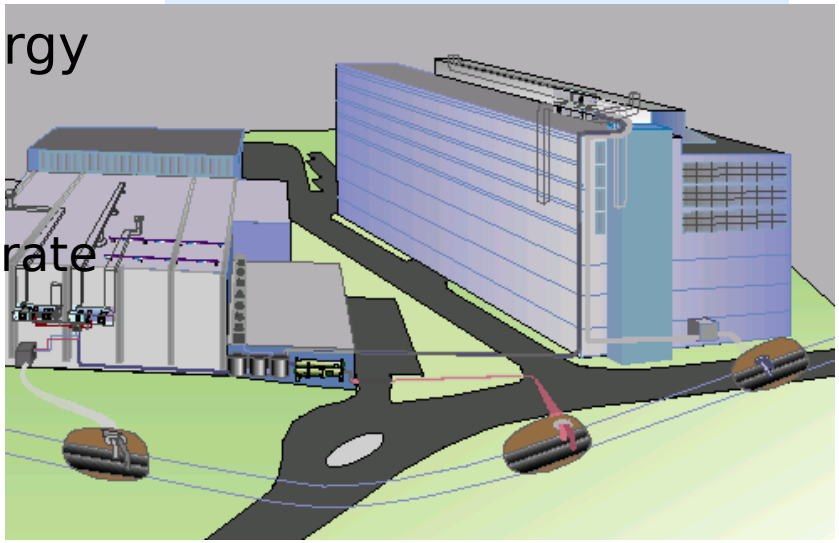
ThermoNet® Building Service System for Indoor Air Quality & Energy Management



Advantages at the BES level

The advantages with the system are:

- Exceptionally low temperature requirement for hot water allows the
- Utilisation of alternative energy sources of thermal energy, e.g. solar thermal or geo thermal energy
- Utilisation of any low T waste energy
- Higher COP of Chillers
- Ideal for district cooling/heating
  - Double the cooling / half the flow rate



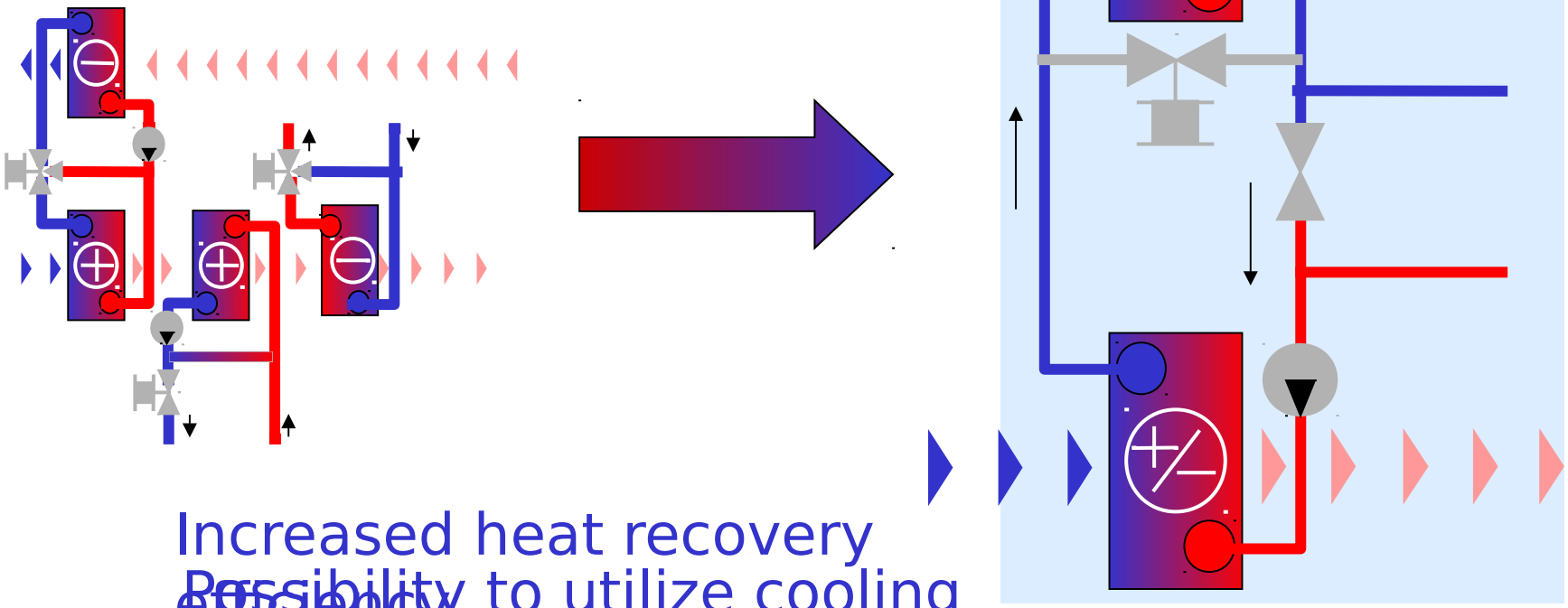
ECONET® -Innovation behind ThermoNet

No leakage flow between supply and exhaust air.

Separated supply and exhaust air units.

1 component, 3 functions.

Shorter AHU.



Increased heat recovery efficiency.

Possibility to utilize cooling recovery.

Possibility to utilize process/waste heat.

Perfect for district cooling/heating.

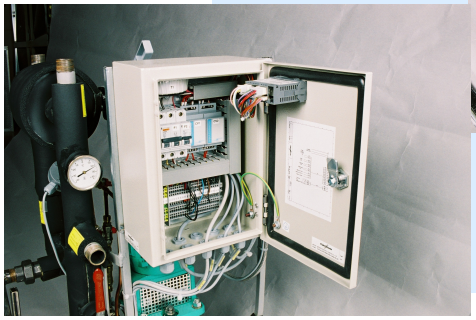
When to apply ThermNet /ECONET

- Indoor air quality and their control have high requirements
- Full optimisation from an energy, hygiene and space point of view is required
- Heating, cooling, heat recovery and cooling recovery are deployed
- Indirect evaporative cooling can be applied
- There is low temperature waste or free energy available
- There is district heating/cooling available
- Demand controlled or variable air volume is a good solution because of operating times, load variations or forecasted changes
- When retrofitting or upgrading an existing system
- A liquid circulated heat recovery from the return air is anyway a good solution,like:
  - There is a risk of contamination, such as in hospitals where the air flows cannot mix
  - There are distributed AHUs
  - There are large air flow rates in the AHUs

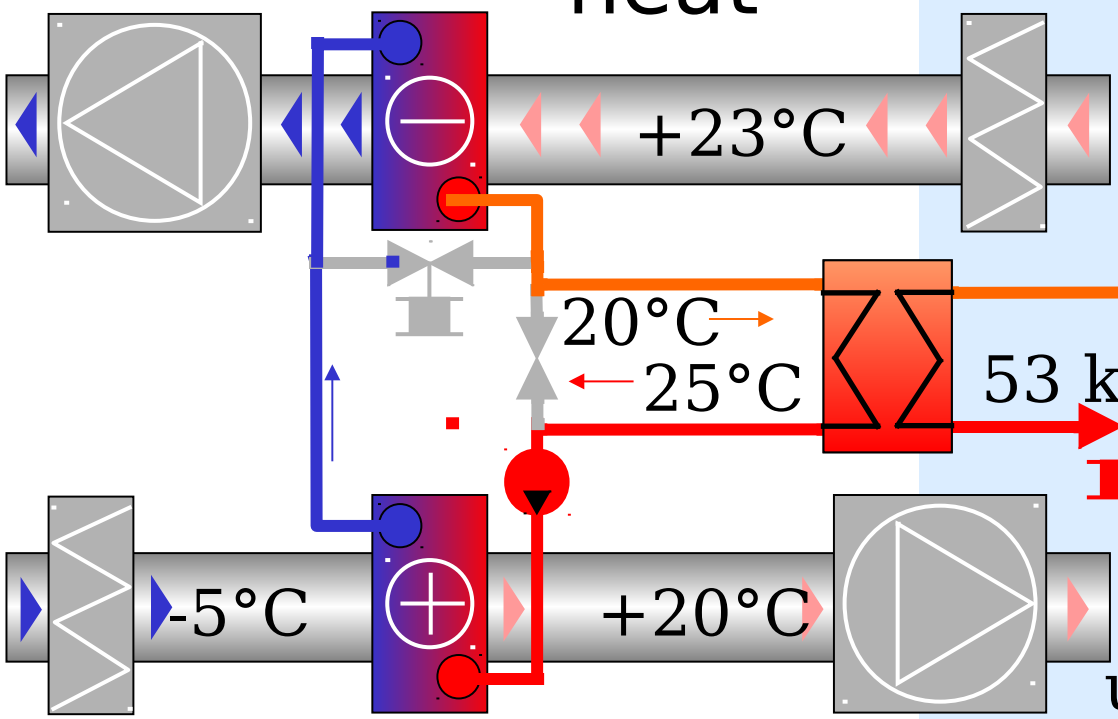
heart of ThermoNet systems

Basic functions:

- Liquid coupled heat recovery section.
- Heating and cooling of supply air integrated in the heat recovery section with heat recovery efficiency 60-75%.
- Control system for heat recovery.
- Pump unit with sensors for heat recovery section.
- Frequency converter for pump
- VAV and Demand Controlled ventilation



Possibility to utilize waste or condensate heat

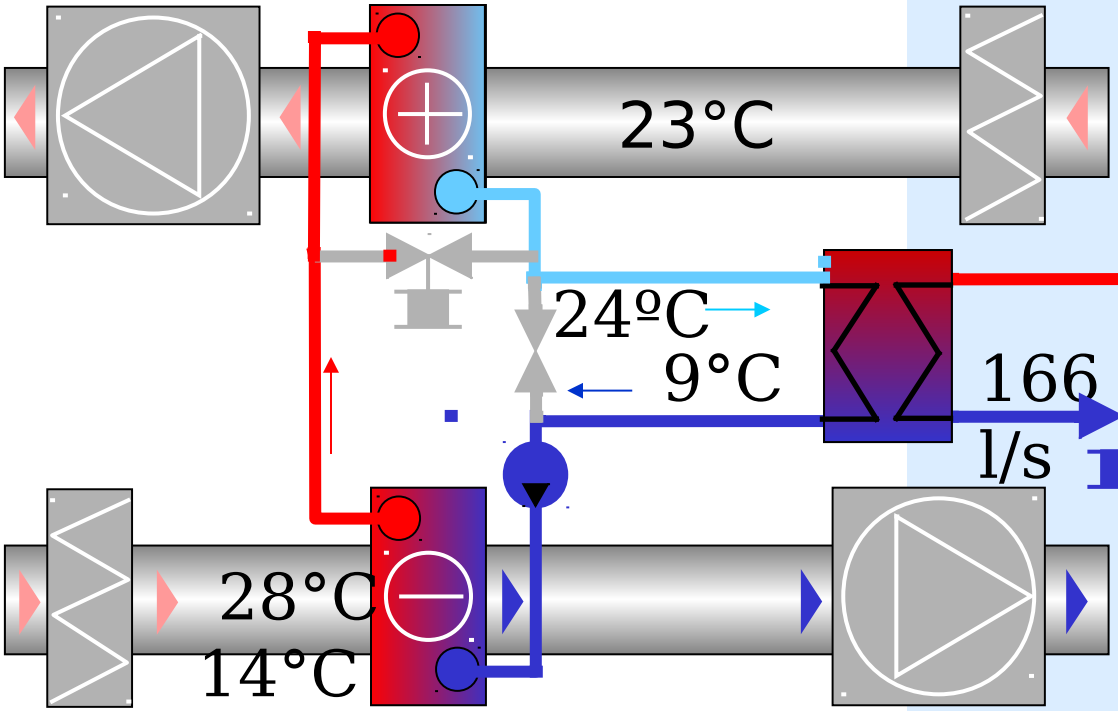


Low heating w
temperatures,
utilization of wa

condensate heat

Outdoor air temperature: -5°C
Airflow : ±8,5 m^3/s
Heat recovery efficiency : η = 70 %

Superior for cooling + cooling recovery



Outdoor air temperature: +28°C, 50 %

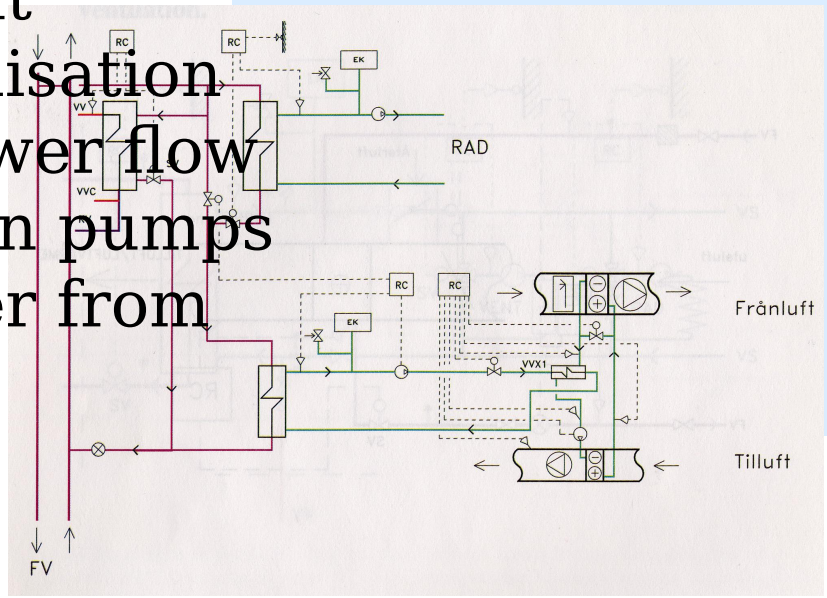
Airflow : ±8,5 m³/s

Reduced cooling power, due to cooling recovery (trad. 6/12°C ->

District Heating Connection

Benefits:

- Lower connection fees to DH system
- Lower investment costs -lower peak demands
- Lower energy costs – heat recovery & waste heat utilisation
- Lower pumping costs- lower flow rate, frequency inverters in pumps
- Utilisation of return water from radiator network



Life Cycle Cost for ECONET/Ecoterm in Finland

Deafault data:

A typical AHU size are selected for Finnish conditions.

EU-53 (8,8 m³/s)

To be able to compare 'an apple to an apple' we have added components as follows:

Ecoterm – a standard round-around heat recovery system:

- Pump unit for heat recovery
- Pump unit for heating coil
- Shunt unit for cooling coil

ECONET:

- Heat exchanger + heating valve
- Cooling exchanger + cooling valve

Running time:

24 hour/day, 365 days/year, CAV

Running costs:

- Heating energy, 0,06 €/kWh
- Cooling energy, 0,02 €/kWh (COP 3)
- Electricity for fans, 0,07 €/kWh

Supply air temperature:

20°C...16°C depending on out door air

Exhaust air:

22°C...24°C depending on out door air

Efficiency variants for ECONET:

5 for supply air coil

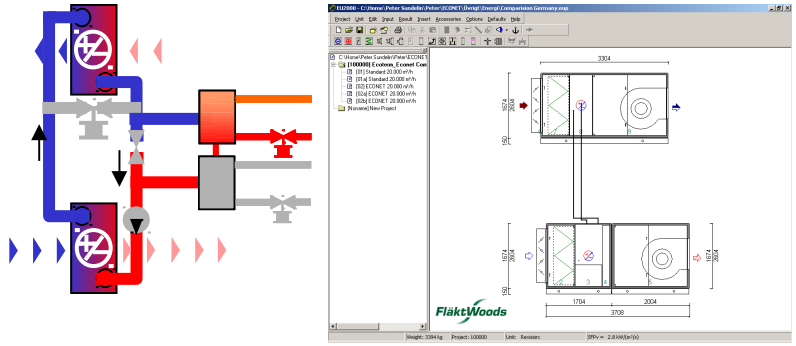
3 for exhaust air coil

Efficiency variant for Ecoterm:

2 for supply air coil

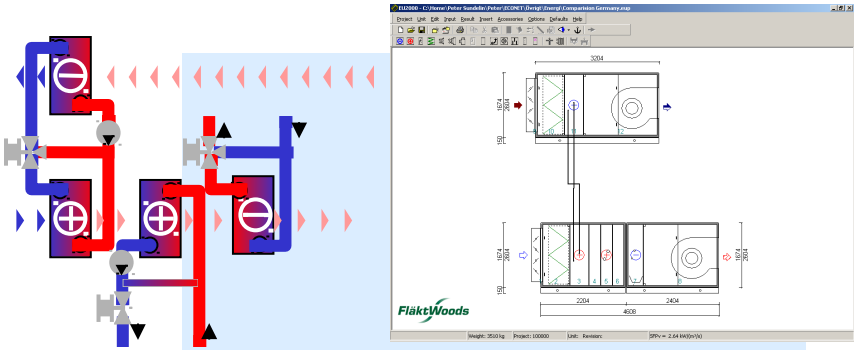
3 for exhaust air

Life cycle cost Analysis



AHU price: ***38600 €***
Exchangers/valves ***3100 €***
Total price: ***41700 €***

Running costs ***33000 €/year.***



AHU price: ***28400 €***
Pump/shunt units ***15400 €***
Total price: ***43800 €***

Running costs ***39400 €/year.***

By comparing ’an apple to an apple’ ECONET has lower investment costs and saves approx. 6400 €/year in running costs.

Case- A Unit in University Hospital

	Traditional		Econet		Reduct	
	Energy (MWh)	Cost (€)	Energy (MWh)	Cost (€)	Energy (MWh)	Cost (€)
Fans	30,6	1801	29,9	1760	0,7	41
Energy,	94,9	2288	58,4	1407	36,5	880
Cooling	6,1	120	6,2	123	-0,1	3
Pump	1,2	68	2,2	132	1	64
Total		4276		3422		-854

	Cost (€)	%
Fans		-2%
Energy,		-38%
Cooling		
Pump		
Total		- 20 %

This real case supports the savings of the theoretical calculation given before

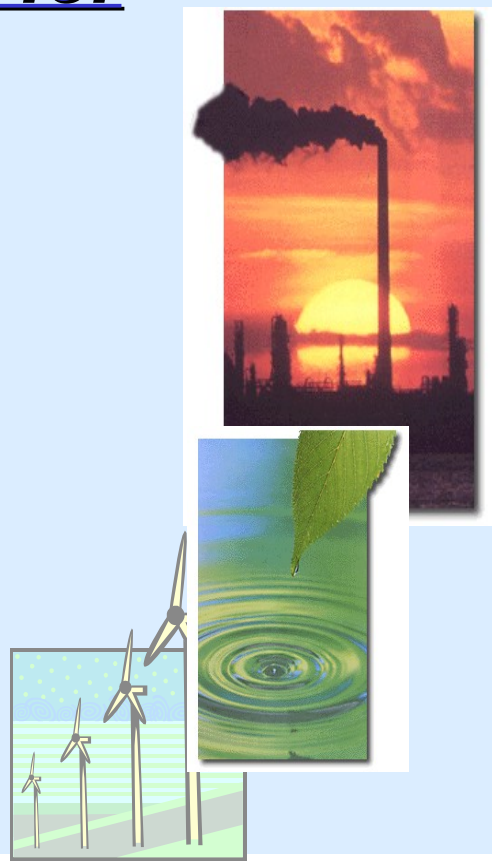
ECONET® applications

Pre-engineered solution developed for

- Supermarkets & shopping centres
- Office buildings
- Hospitals
- Industrial workshops
- Housing

Integrated solution developed for

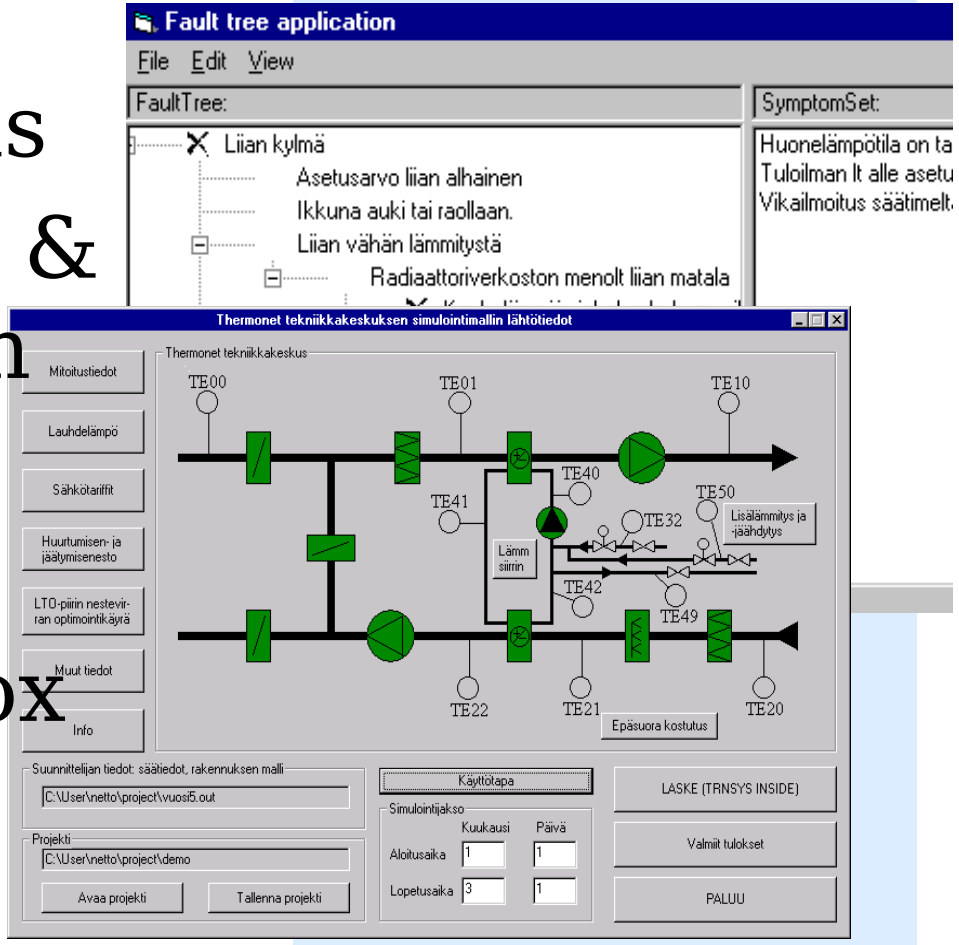
- District heating / Cooling
- Local cooling
- Geothermal / Groundwater
- Solar thermal
- Heat pump



We have even delivered these applications

ECONET Tools

- Dimensioning Tools
- System simulation & Energy Calculation
- Life Cycle Assessment
- Diagnostics Toolbox



Business statistics

References:

Universities: Lund, Uppsala, Gothenburg - Sweden

IKEA: Helsingborg - Sweden

ICA Maxi Shopping Centre: Karlstad etc. - Sweden

Arla Food industry: Vimmerby - Sweden

Clinical Research Centre: Malmö - Sweden

Biomedicum: Turku - Finland

Åbo hospital TYKS: Turku/Finland

Shopping Centre / hotel: Oslo - Norway

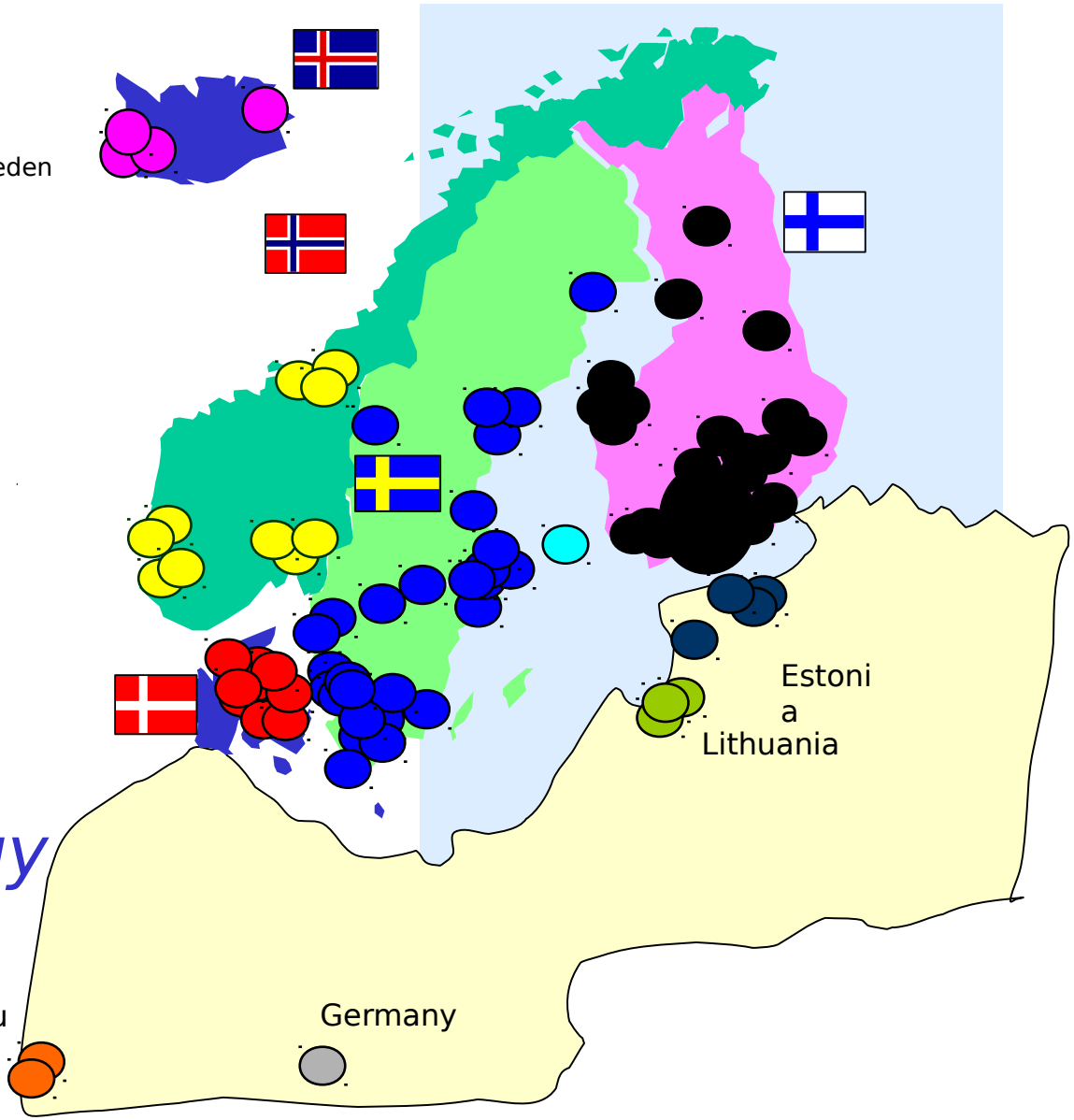
Hospital St Olav: Trondheim - Norway

Shell: Copenhagen - Denmark

NATO: Brussels - Belgium

Music Hall, Tallinn - Estonia

Proven technology with continuous innovations

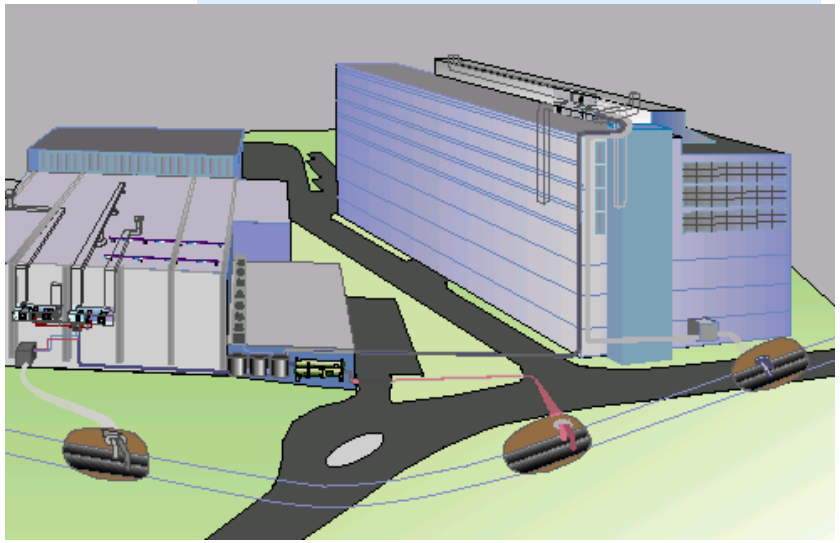


Rewards

”Energia Hippu”- Award by the Finnish District Heating Association

“Air Movement Product of the Year” award at the prestigious Heating & Ventilation News Awards (UK)

First Heat Recovery product in the UK Government Enhanced Capital Allowance scheme



Since the year 2000 over 500 systems have been sold.

”We Bring Air to Life”

FläktWoods